Thank you for purchasing this Esco Ultra-Low Temperature Freezer. Please read this manual thoroughly to familiarize yourself with the many unique features and exciting innovations we have built into your new equipment. Esco provides many other resources at our website, www.escoglobal.com, to complement this manual and help you enjoy many years of productive and safe use of your Esco products.

User Manual

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Lexicon®

Ultra-Low Temperature Freezer

Esco UUS User Manual
Version A - Released May 2011

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Table of Contents

Introductory Page

i Table of Contents
iii Manual Revision History
iv Warranty Terms and Conditions
vi Introduction
vi 1. Products Covered
vi 2. Safety Warning
vi 3. Important User Information
vi 4. Limitation of Liability
vii 5. European Union Directives on WEEE and RoHS
viii Declaration of Conformity

1 Chapter 1 – Product Information

1 1.1 About Lexicon Ultra-Low Temperature Freezers
1 1.2 Labels
2 1.3 Quick View
2 1.3.1 Front Quick View
3 1.3.2 Back Quick View

5 Chapter 2 – Installation

5 2.1 General Requirements
5 2.1.1 Location Requirements
6 2.1.2 Environmental Requirements
6 2.1.3 Power Requirements
6 2.2 Installation
6 2.2.1 Unit Leveling
7 2.2.2 Shelves Installation
8 2.2.3 Omega Brackets Installation
8 2.2.4 Remote Alarm Contacts Connection
8 2.2.5 Electrical Supply Connection and Power Protection Bracket Installation
9 2.3 First Run
9 2.4 Disclaimer

11 Chapter 3 – Control System and Operation

11 3.1 Freezer Control System
11 3.2 Temperature Offset Calibration
12 3.3 Set Temperature & Hysteresis
12 3.4 Operating the Freezer
12 3.4.1 Products Loading
12 3.4.2 Opening and Closing the Door
12 3.4.3 Locking the Main Door
13 3.5 Alarm
13 3.5.1 High Temperature Alarm
13 3.5.2 Power Failure Alarm

15 Chapter 4 – General Maintenance

15 4.1 Scheduled Maintenance
15 4.2 General Cleaning
15 4.3 Condenser Cleaning
15 4.4 Air Filter Cleaning
16 4.5 Door Gasket Cleaning
16 4.6 Vacuum Relief Port Cleaning
16 4.7 Defrost and Cleaning
16 4.8 PF Battery Checking

16 4.9 Preparing the Unit for Storage
16 4.10 Maintenance/Service Log
17 Chapter 5 – Accessories Installation
17 5.1 LCO_2/LN_2 Backup System
17 5.2 Chart Recorder

19 Chapter 6 – Troubleshooting

Appendix

MANUAL REVISION HISTORY

REV. NO.	DATE RELEASED	DESCRIPTION OF CHANGE	REFERENCE	SERIAL # OF 1ST UNIT FOR IMPLEMENTATION

Warranty Terms and Conditions

Esco products come with a limited warranty. The warranty period will vary depending on the product purchased, beginning on the date of shipment from any Esco international warehousing location. To determine which warranty applies to your product, refer to the appendix below.

Esco's limited warranty covers defects in materials and workmanship. Esco's liability under this limited warranty shall be, at our option, to repair or replace any defective parts of the equipment, provided if proven to the satisfaction of Esco that these parts were defective at the time of being sold, and that all defective parts shall be returned, properly identified with a Return Authorization.

This limited warranty covers parts only, and not transportation/insurance charges.

This limited warranty does not cover:

- Freight or installation (inside delivery handling) damage. If your product was damaged in transit, you must file a claim directly with the freight carrier.
- Products with missing or defaced serial numbers.
- Products for which Esco has not received payment.
- Problems that result from:
    - External causes such as accident, abuse, misuse, problems with electrical power, improper operating environmental conditions.
    - Servicing not authorized by Esco.
    - Usage that is not in accordance with product instructions.
    - Failure to follow the product instructions.
    - Failure to perform preventive maintenance.
    - Problems caused by using accessories, parts, or components not supplied by Esco.
    - Damage by fire, floods, or acts of God.
    - Customer modifications to the product
- Consumables such as filters (HEPA, ULPA, carbon, pre-filters) and fluorescent / UV bulbs.
- **Esco is not liable for any damage incurred on the objects used on or stored in Esco equipment. If the objects are highly valuable, the use of a completely independent backup system and a 24-hr redundant monitoring system with alarm capability are recommended.**

Factory installed, customer specified equipment or accessories are warranted only to the extent guaranteed by the original manufacturer. The customer agrees that in relation to these products purchased through Esco, our limited warranty shall not apply and the original manufacturer's warranty shall be the sole warranty in respect of these products. The customer shall utilize that warranty for the support of such products and in any event not look to Esco for such warranty support.

Esco encourages all users to register their equipment online at www.escoglobal.com/warranty or complete the warranty registration form included with each product.

ALL EXPRESS AND IMPLIED WARRANTIES FOR THE PRODUCT, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE LIMITED IN TIME TO THE TERM OF THIS LIMITED WARRANTY. NO WARRANTIES, WHETHER EXPRESS OR IMPLIED, WILL APPLY AFTER THE LIMITED WARRANTY PERIOD HAS EXPIRED. ESCO DOES NOT ACCEPT LIABILITY BEYOND THE REMEDIES PROVIDED FOR IN THIS LIMITED WARRANTY OR FOR SPECIAL, INDIRECT, CONSEQUENTIAL OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, ANY LIABILITY FOR THIRD-PARTY CLAIMS AGAINST YOU FOR DAMAGES, FOR PRODUCTS NOT BEING AVAILABLE FOR USE, OR FOR LOST WORK. ESCO'S LIABILITY WILL BE NO MORE THAN THE AMOUNT YOU PAID FOR THE PRODUCT THAT IS THE SUBJECT OF A CLAIM. THIS IS THE MAXIMUM AMOUNT FOR WHICH ESCO IS RESPONSIBLE.

These Terms and Conditions shall be governed by and construed in accordance with the laws of Singapore and shall be subject to the exclusive jurisdiction of the courts of Singapore.

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Global Email Helpdesk: support@escoglobal.com
Visit http://www.escoglobal.com/ to talk to a Live Support Representative
Distributors are encouraged to visit the Distributor Intranet for self-help materials.

Product Appendix, Warranty Listings

Biological Safety Cabinets, Laminar Flow Cabinets, HEPA-Filtered Cabinets (except Streamline brand)	The warranty periods for BSC may vary by country. Contact your local distributor for specific warranty details.
Laboratory Fume Hoods	2 years limited.
Ductless Fume Hoods	4 years limited for Ascent Opti, 6 years for Ascent Max.
Cleanroom Equipment	1 year limited.
Laboratory Ovens and Incubators	1 year limited.
CO_2 Incubators	2 years limited.
Containment/Pharma Products	2 years limited.
Ultralow Temperature Freezer	5 years limited. 5 years on Compressor.

The warranty period starts two months from the date your equipment is shipped from Esco facility for international distributors. This allows shipping time so the warranty will go into effect at approximately the same time the equipment is delivered to the user. The warranty protection extends to any subsequent owner during the warranty period. Distributors who stock Esco equipment are allowed an additional four months for delivery and installation, providing the product is registered with Esco. User can register product online at www.escoglobal.com/warranty or complete the warranty registration form included with each product.

Policy updated on 1st January 2012 (This limited warranty policy applies to products purchased on and after 1st January 2012)

Introduction

1. Products Covered

Lexicon Ultra-Low Temperature Freezer			
Model	**Storage Volume**	**Temperature Range**	**Freezer Control**
UUS-439A-1	439.7 Liter / 15.5 ft^3	-50°C to -86°C	Microprocessor Controller
UUS-552A-1	552.8 Liter / 19.5 ft^3		
UUS-668A-1	668.8 Liter / 23.6 ft^3		
UUS-793A-1	793.6 Liter / 28.0 ft^3		

Power rating for all models is 230 VAC, 50 Hz, 1 Φ

2. Safety Warning

- Anyone working with, on or around this equipment should read this manual. Failure to read, understand and follow the instructions given in this documentation may result in damage to the unit, injury to operating personnel, and / or poor equipment performance.
- Any internal adjustment, modification or maintenance to this equipment must be undertaken by qualified service personnel.
- The use of any hazardous materials in this equipment must be monitored by an industrial hygienist, safety officer or some other suitably qualified individual.
- Before you proceed, you should thoroughly understand the installation procedures and take note of the environmental / electrical requirements.
  In this manual, important safety related points will be marked with the symbol
- If the equipment is used in a manner not specified by this manual, the protection provided by this equipment may be impaired.

3. Important User Information

- Power Failure Switch located behind the right bottom door should always be turned “ON” when the unit is running.
- High Temperature Alarm Switch located behind the right bottom door should remain "OFF" during initial start-up run in order to avoid nuisance alarm beeping during pull-down. It should only be turned “ON” once the unit has reached the temperature set point.
- Battery should be replaced when the voltage falls below 11 volts or after one year of operation, whichever comes first.
- **CAUTION!** To have the highest level of protection on stored samples, the use of a completely independent backup system and a 24-hr redundant monitoring system with alarm capability is recommended.

4. Limitation of Liability

The disposal and / or emission of substances used in connection with this equipment may be governed by various local regulations. Familiarization and compliance with any such regulations are the sole responsibility of the users. Esco’s liability is limited with respect to user compliance with such regulations.

5. European Union Directive on WEEE and RoHS

The European Union has issued two directives:

• **Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE)**

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. It is marked with the following symbol:

Esco sells products through distributors throughout Europe. Contact your local Esco distributor for recycling/disposal.

• **Directive 2002/95/EC on Restriction on the use of Hazardous Substances (RoHS)**

With respect to the directive on RoHS, please note that this freezer falls under category 8 (medical devices) and category 9 (monitoring and control instruments) and is therefore exempted from requirement to comply with the provisions of this directive.

Declaration of Conformation

In accordance to EN ISO/IEC 17050-1:2010

We, Esco Micro Pte. Ltd.
of 21 Changi South Street 1
Singapore, 486777
Tel: +65 6542 0833
Fax: +65 6542 6920

declare on our sole responsibility that the product:

Category : Ultra-Low Temperature Freezer
Brand : Lexicon
Model : UUS-439A-1, UUS-552A-1, UUS-668A-1, UUS-793A-1

in accordance with the following directives:

2006/95/EEC : The Low Voltage Directive and its amending directives
92/31/EEC : The Electromagnetic Compatibility Directive and its amending directives

has been designed to comply with the requirement of the following Harmonized Standard:

Low Voltage : EN 61010-1:2010
EMC : EN 61326-1:2006 Class B

More information may be obtained from Esco's authorized distributors located within the European Union. A list of these parties and their contact information is available on request from Esco.

XQ Lin
Group CEO, Esco

This Declaration of Conformity is only applicable for 230V AC 50Hz units

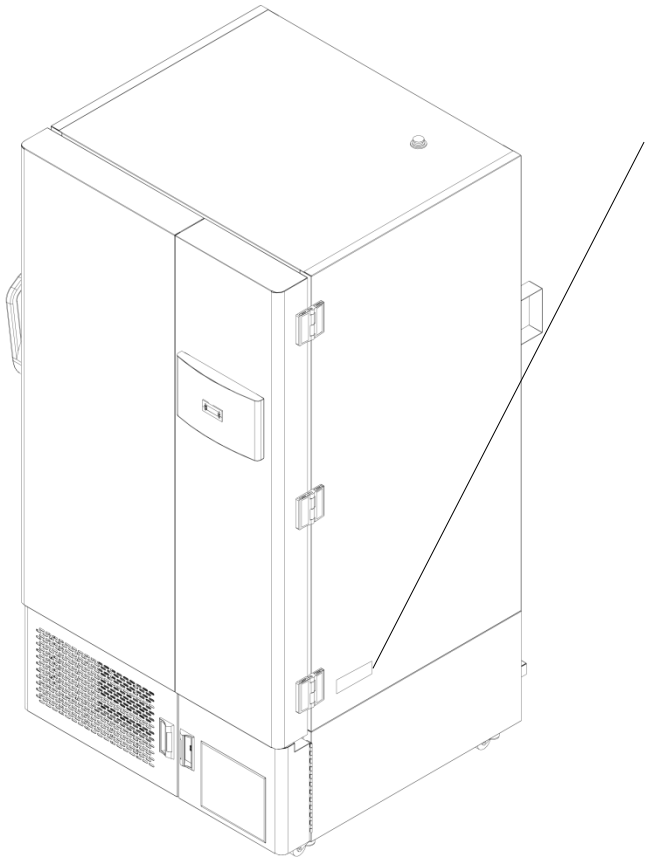
Chapter 1 - Product Information

1.1 About Lexicon™ Ultra-Low Temperature Freezers

Esco Lexicon™ ultra-low temperature freezers are designed to store critical biological samples, agents and general non-flammable laboratory materials at a temperature range of -50°C to -86°C. Among many features and characteristics, long term reliability of the freezers to sustain the required cold temperature, low sound level and low energy consumption are priorities. The freezer units feature a simple microprocessor control that allows an easy and direct set point control, a heavy duty latch for secure door seal, and four adjustable shelves of 45.36 kg (100 lbs.) capacity each.

ESCO Lexicon™ ULT's are manufactured with the best manufacturing techniques and highest standards known in the field of specialty refrigeration equipment.

1.2 Labels

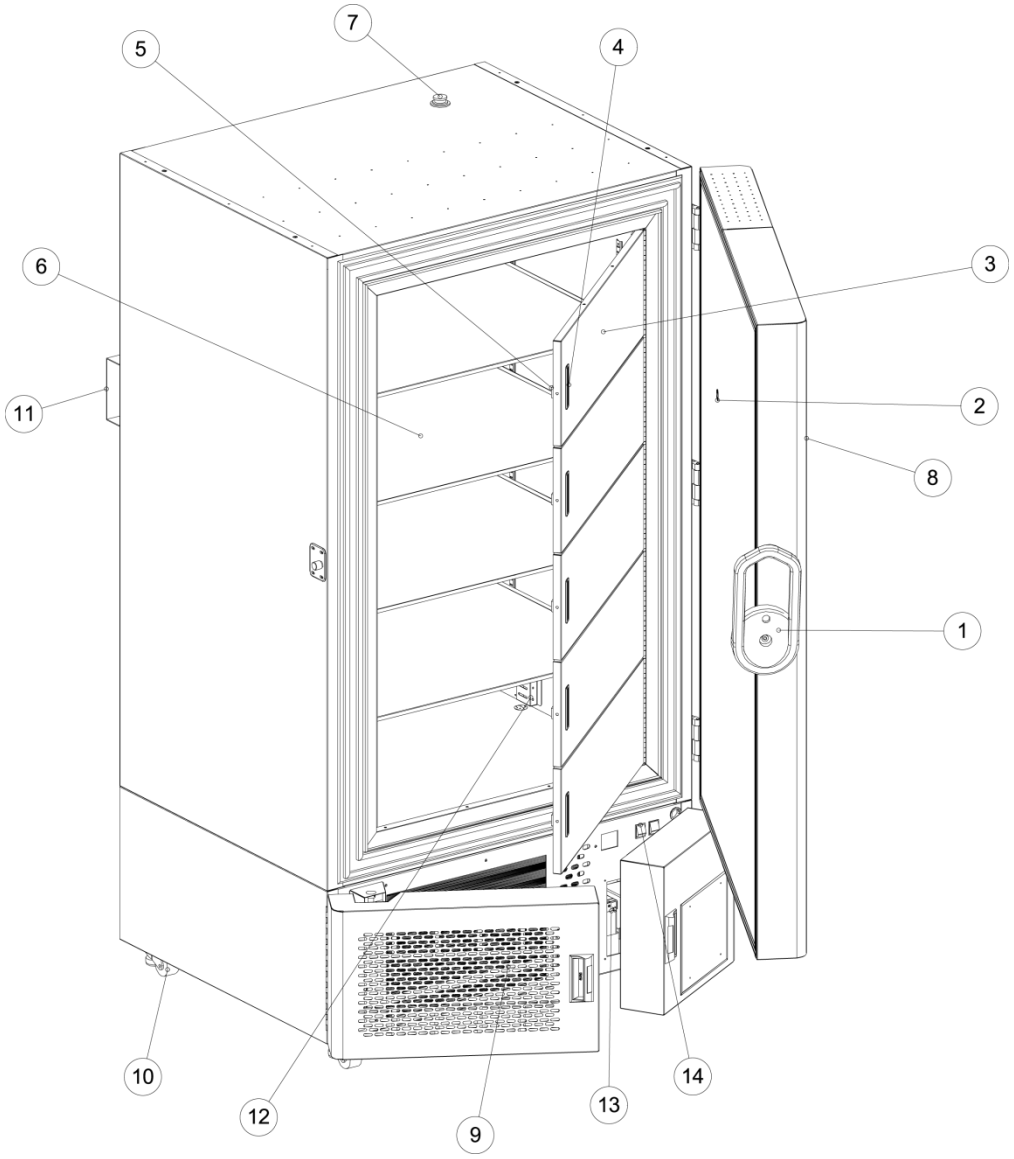


Model: UUS-668A-1
Serial: 2011 - 54794
Manufactured in 2011
Electrical : 220-240VAC 50HZ 1PH
Refrigerant Charge & Charge Pressure
First Stage : R-404A : 680 gr (vac to 150 psig)
Second Stage : R-290 : 24 gr (vac to 30 psig)
R-508B : 220 gr (30 to 130 psig)
ESCO
WORLD CLASS. WORLDWIDE.
Esco Technologies, Inc. • 2940 Turnpike Drive, Units 15-16 • Hatboro, PA 19040, USA • Toll-Free USA and Canada 888-375-ESCO • Tel 215-441-9661 • Fax 215-441-9660 • us.escoglobal.com • usa@escoglobal.com
Esco Micro Pte. Ltd. • 21 Changi South Street 1 • Singapore 486 777
Tel +65 6542 0833 • Fax +65 6542 6920 • mail@escoglobal.com • www.escoglobal.com
5283

Model – model of the unit
Serial – the unit's serial number
Manufactured in … - year of manufacture
Electrical – electrical requirement
Refrigerant Charge:
First Stage – amount, type and charge pressure of refrigerant charging
Second Stage – amount, type and charge pressure of refrigerant charging

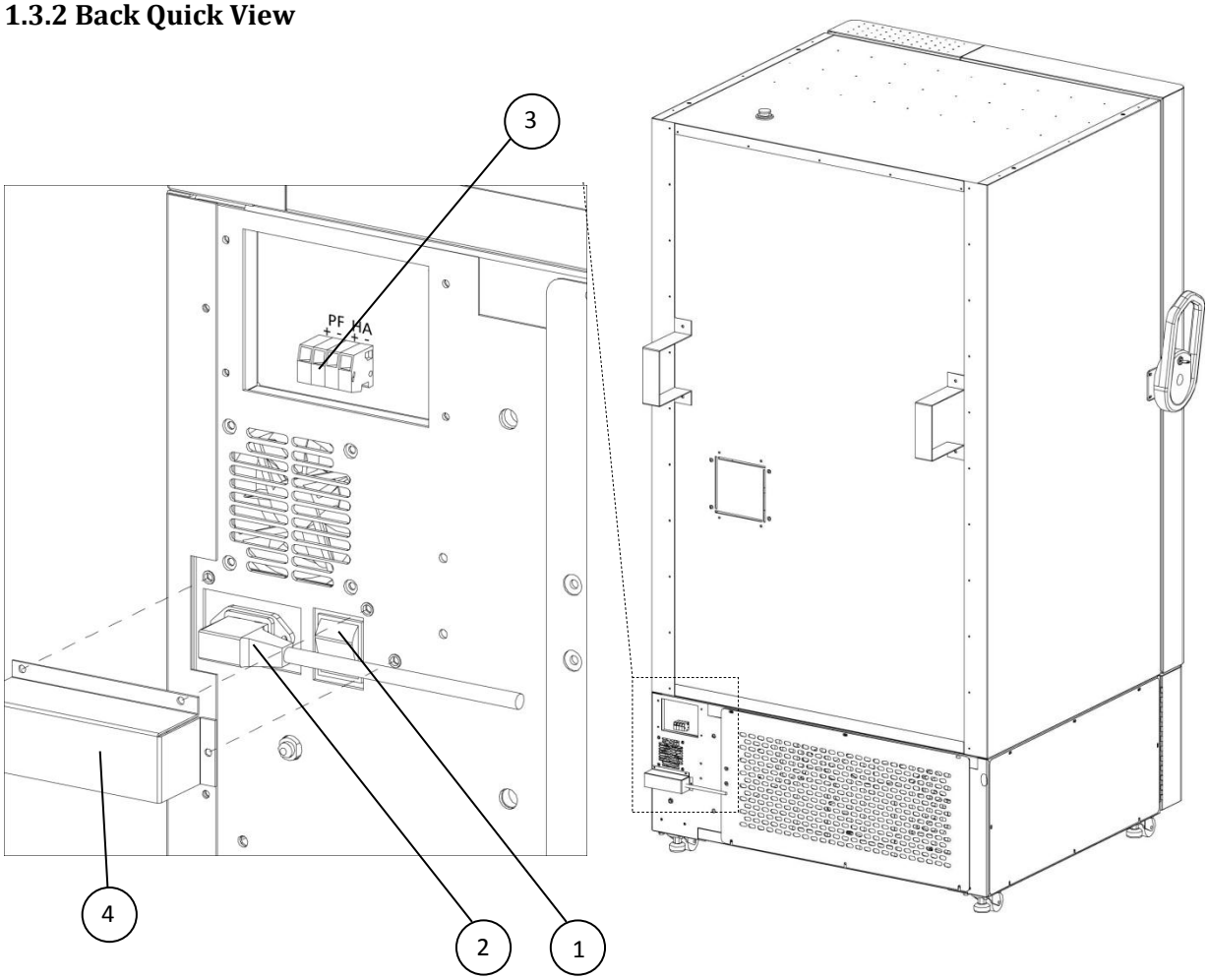
1.3 Quick View

1.3.1 Front Quick View



1. Main Handle
2. Vacuum Relief
3. Inner Door
4. Embedded Pulls
5. Inner Doors Magnet
6. Shelves
7. Access Port
8. Control Panel
9. Air Vents / Intakes
10. Caster Wheel with Adjustable Foot
11. Cabinet Support
12. Control Probe
13. Power Failure (PF) Battery Location
14. PF Battery Disconnect Switch

1.3.2 Back Quick View



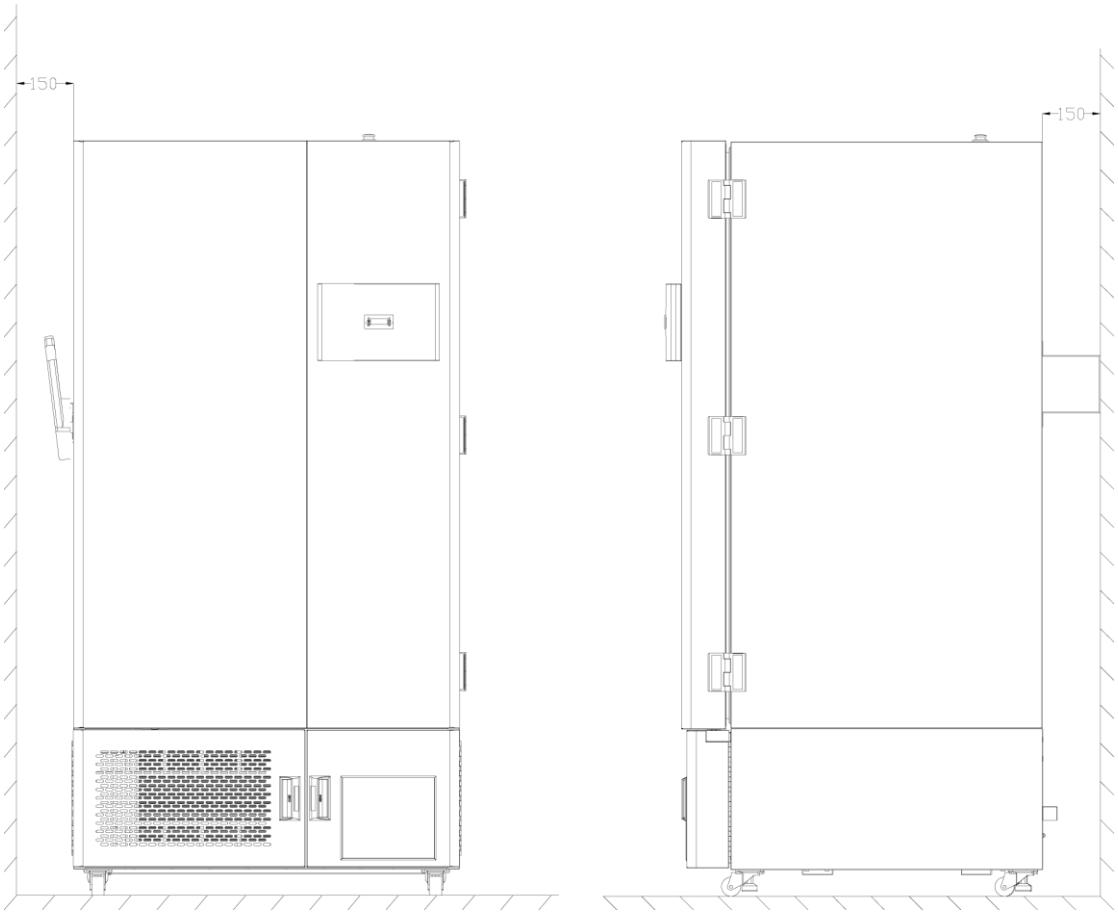
1. Main Switch
2. Power Inlet
3. Remote Alarm Contact
4. Power Protection Bracket

Chapter 2 – Installation

2.1 General Requirement

2.1.1 Location Requirements

- Install the unit on a firm and level floor in an indoor environment.
- Allow at least 150 mm (6”) of open space on all sides from the sides, top and rear.



- The location should be sufficiently ventilated so the heat from the unit can be removed from the area to prevent any potential overheating condition of the ambient temperature.
- Avoid installing a unit in an area with direct heat source such as sunlight, heat radiator, and other heat sources.

2.1.2 Environmental Requirements

- Indoor use
- Altitudes of up to 2000 meters (6600')
- Up to 90% relative humidity – non-condensing
- Temperature between 15°C - 32°C (59°F - 90°F)
  Note: *Recommended operating temperature is 25°C (77°F).*
- Must be installed in room with sufficient ventilation. The room ventilation should be a technical ventilation that is in accordance with the requirements of ZH 1/119 (Guidelines for laboratories) or some other suited ventilation system with appropriate capacity.

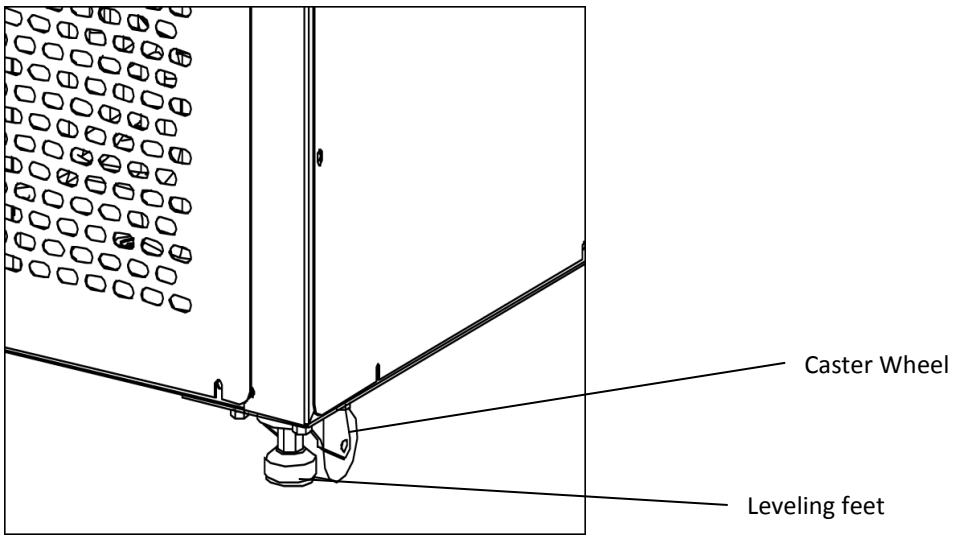
2.1.3 Power Requirements

- Designed for 230 VAC 50Hz 1Φ electrical rating
- An unobstructed dedicated power outlet which is not shared with other appliances.
- Installation Category: II
  Note: *Installation category (over voltage category) defines the level of transient over voltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply and its over voltage protection means. For example, in CAT II, which is the category used for instruments in installations supplied from a supply comparable to public mains such as hospital and research laboratories and most industrial laboratories, the expected transient over voltage is 2500 V for a 230 V supply and 1500 V for a 120 V supply.*
- Performance criteria B in voltage dips & short interruptions immunity test.
  Note: *During the voltage dips & short interruptions immunity test, flicker of the fluorescent light was observed when the voltage dips and short interruption were being applied on the AC mains port of the equipment and self-recovered after the test.*
- It is recommended that the voltage fluctuation doesn't exceed ±10% of the nominal voltage at all times, or else an electrical power stabilizer can be installed.
- UPS is recommended for better protection. If UPS is not used and there is a power failure, the operator must take immediate action to prevent the danger of potential warm-up.

2.2 Installation

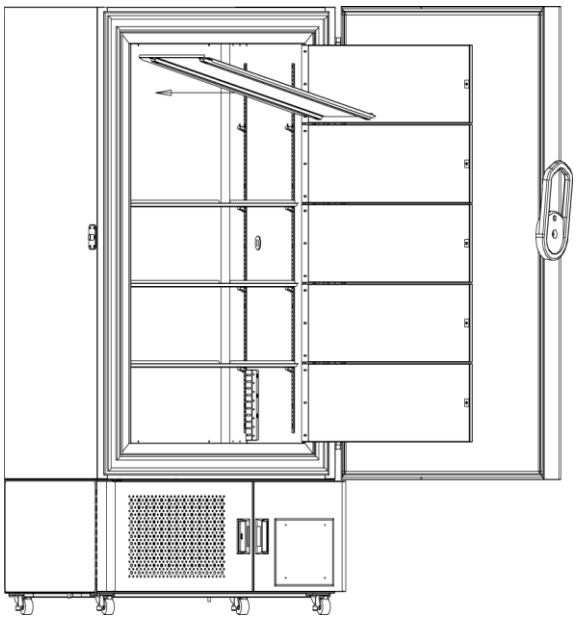
2.2.1 Unit Leveling

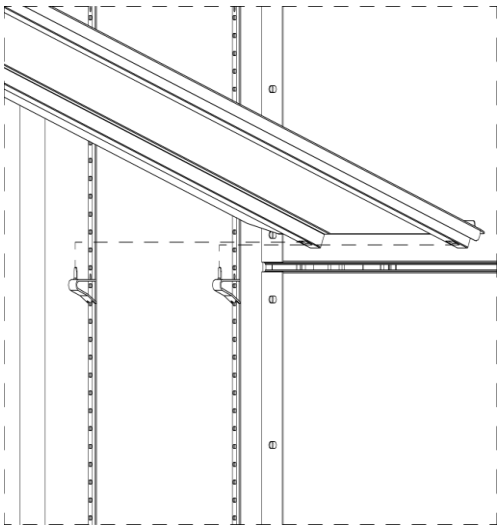
It is important that the equipment is properly leveled by positioning a bubble level on the middle shelf of the freezer. The freezer has built in leveling feet for adjustment. To raise a corner with a leveling foot, use a cross wrench to turn the leveling leg that appears to be in a low position in the counterclockwise direction.



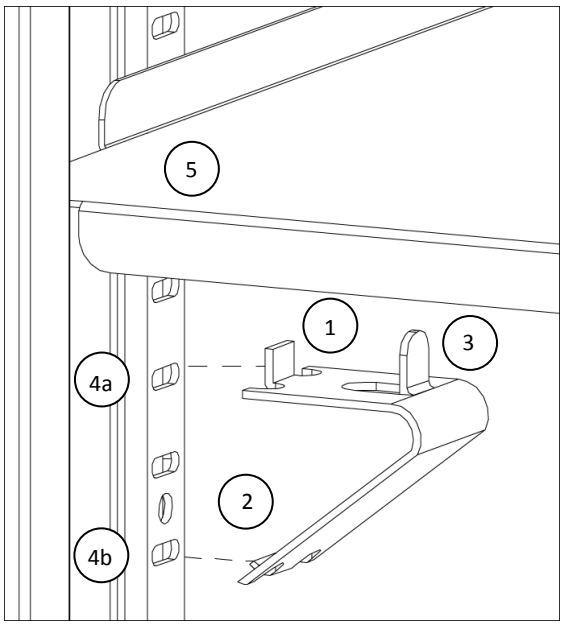
2.2.2 Shelves Installation

To change the position of the shelves, remove and re-install the pilaster clips (front and back) at desired shelf level.





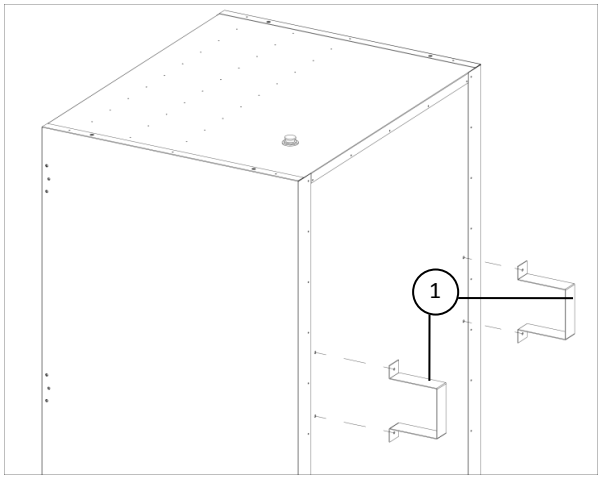
1. Open main door
2. Open all inner doors
3. Rotate shelf 45^{o} vertically
4. Slide the shelf into the freezer chamber – on top of the pilasters
5. Ensure the pilaster clips go through the holes on the shelf



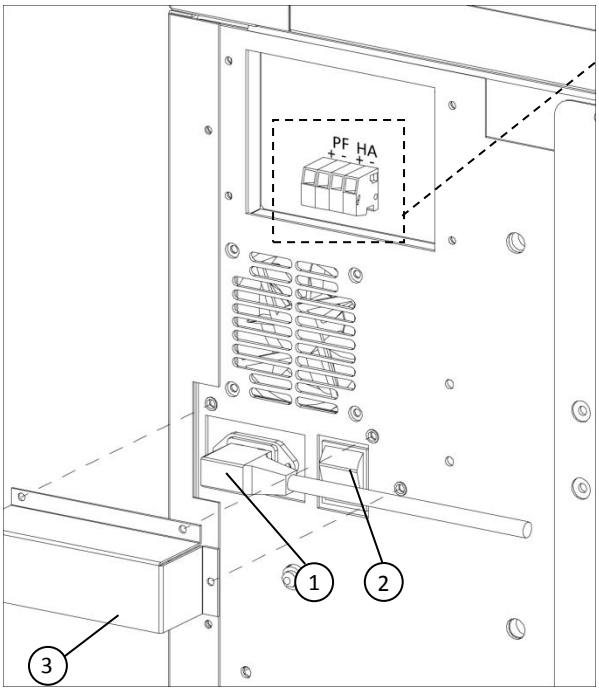
1. Put the first hook (1) into the pilaster hole (4a)
2. Press upwards, then put the second hook (2) into the pilaster hole (4b)
3. Install the shelf by aligning the third hook (3) with the shelf hole - hole located underneath the shelf (5)

2.2.3 Omega Brackets Installation

Omega brackets are used to ensure the required distance from the wall is maintained.



1. Attach the bracket(1) to its place – sync the hole in the bracket(1) to the hole in the unit
2. Screw the M6 bolts into the designated place (the holes on top and below the bracket(1))
3. Repeat the 2 steps above with the other bracket(1)



2.2.4 Remote Alarm Contacts Connection

External alarm can be connected to the remote alarm contacts located at the back of the freezer base above the power cord. These remote alarm contacts will transmit a DC voltage upon occurrence of a high temperature (HA) and power failure (PF) alarm. The contacts provide 12 VDC (+) and (-) connectivity.

2.2.5 Electrical Supply Connection and Power Protection Bracket Installation

Plug the power cord (1) into the power inlet at the rear of the unit. Turn on the power switch (2). Install the power protection bracket (3) over the power cord and power switch by installing the 3 screws into the pre-tapped holes.

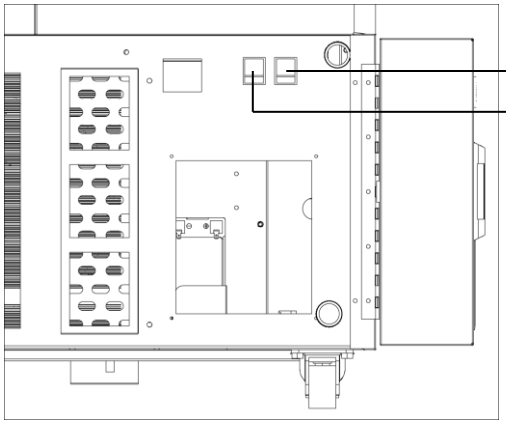
2.3 First Run (Also required whenever the freezer is turned off or moved)

Before activating the unit for the first time, ensure that there's no object other than the shelves inside the freezer.

Turn on the power switch. The controller will light up. The first stage compressor gets the power and starts working. When the heat exchanger inside the freezer becomes cold enough and reaches a predetermined temperature, the second stage compressor starts. The unit continues to operate until it reaches the set temperature.

Lexicon™ Ultra-Low Temperature freezers have an operating temperature of -50 °C to -86 °C, depending on the ambient temperature. The freezer is shipped from the factory with a temperature set point of -80 °C. Refer to section 3.2 to change temperature setting.

ULTF S-series controller has 2 switches for alarms located behind the right bottom door.



Power failure switch should always be turned on when the unit runs. (**Warning:** *Make sure the scheduled maintenance for PF battery is carried out; refer to chapter 4, to ensure the battery stays charged when the unit is on*).

On the other hand, high temperature alarm switch should remain off during initial start-up run in order to avoid nuisance alarm beeping during pull down. It should only be turned on once the unit has reached the temperature set point.

Once the unit reaches set point temperature, open the outer and the inner doors to load in half of the racks. In the process of doing so, the freezer temperature is expected to warm up. Let the unit recover to the set temperature then load in the rest of the racks.

If the freezer does not require any racks, let the unit run at set point for at least 48 hours for observation before placing any products inside the unit.

2.4 Disclaimer

The performance and safety of the freezer, while rigorously evaluated at the factory, cannot be guaranteed after transit and installation. Therefore the on-site testing is always recommended.

Chapter 3 - Control System and Operation

3.1 Freezer Control System

LED K1, K2

- LED K2 lit up when respective relay connected to high/low temperature alarm energized
- LED K1 lit up when the respective relay connected to 1st stage compressor energized

START/STOP Button

- To start/stop the freezer operation

PROGRAMMING (P) button

- To set up freezer's programming

UP and DOWN button

- To increase or decrease a value in the menu options

3.2 Temperature Offset Calibration

The control probe may need to be calibrated once the unit has passed the stabilization period. A good laboratory practice would require at least annual calibration check.

Calibrating the Control Probe

Place a calibrated temperature recording instrument next to the PT100 sensor located inside the sensor cover at the bottom right corner of the cabinet. Allow the freezer to stabilize for at least 2 hours if the unit has been in service or at least 12 hours if the freezer is being started up for the first time. Compare the calibrated temperature reading to the freezer display temperature. The offset value is determined by the difference between the two readings.

Warning: *It is imperative that only properly calibrated reference instruments should be used for calibration*

Step	Action	Press	Display Show	
			First	Second
1	Press "P" key for 3 seconds (the second display shows chamber temperature; eg: 15°C)	P		**15**
2	Set code 72 for accessing the parameter level by using the ▼ and ▲keys	▼and ▲	COd	**72**
3	Press "P" key until offset	P		
4	Set the offset value by using the ▼ and ▲keys (the second display shows offset point; eg: 0°C)	▼and ▲	OFt	**0.0**
6	Press "P" key to confirm	P		
7	Allow some time for the instrument to switch back to the process value display			

Temperature Stabilization Periods

- **Startup –** Allow 12 hours for the temperature in the cabinet to stabilize before proceeding with calibration
- **Already Operating –** Allow at least 2 hours after the display reaches set point temperature to stabilize before proceeding with calibration

3.3 Set Temperature & Hysteresis

The freezer is shipped from factory with temperature set point -80°C and hysteresis 1°C. The LCD screen will blink between the first and the second display

Step	Action	Press	Display Show	
			First	Second
1	Press "P" key for 3 seconds (the second display shows chamber temperature; eg: 15°C)	P		**15**
2	Set code 72 for accessing the parameter level by using the ▼ and ▲keys	▼and ▲	COd	**72**
3	Press "P" key to set the temperature	P		
4	Set the temperature value by using the ▼ and ▲keys (the second display show set point temperature; eg: -80°C)	▼and ▲	SP	**-80**
	Press "P" key to set the hysteresis	P		
6	Set the hysteresis value by using the ▼ and ▲keys (the second display show set point hysteresis; eg: 1°C)	▼and ▲	HYS	**1**
7	Press "P" key to confirm	P		
8	Allow some time for the instrument to switch back to the process value display			

3.4 Operating the Freezer

3.4.1 Product Loading

Loading of warm product into the freezer should be done in batches. Do not fill the freezer with product of more than 25 percent of the volume at one time as this process might introduce too much heat load into the freezer. Allow freezer to stabilize. Once the temperature of the freezer returns to the set point, another batch of product can be loaded in.

- Fill an upright by starting at the bottom near the probe and add products to racks to one shelf at a time, allow freezer to recover to set point or temperature between shelves
- Fill empty shelves with frozen water jugs, for example, to help overall performance
- Always make sure the vacuum relief port is free of frost and ice, to allow for timely re-opening of the main door.

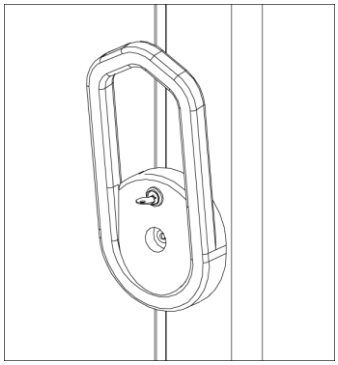
ESCO ULTs are designed for long term storage. It is recommended that only pre-frozen products be placed in the unit as that will reduce the amount of heat load that must be absorbed by the freezer at one time.

CAUTION! EXTREME LOW TEMPERATURE. Do not touch the inside chamber surfaces with exposed skin.

3.4.2 Opening and Closing Doors

Main door and inners doors should be closed tightly at all times. When taking the samples out, open the main door and then open only one inner door at a time.

3.4.3 Locking the Main Door



Main door can be locked with the standard key set provided.

3.5 Alarm

3.5.1 High/Low Temperature Alarm

If 'Set Point" is changed, the 'Alarm High' and 'Alarm Low' will also change. To modify the alarms:

Step	Action	Press	Display Show	
			First	Second
1	Press "P" key for 3 seconds (the second display shows chamber temperature; eg: 15°C)	P		**15**
2	Set code 72 for accessing the parameter level by using the ▼ and ▲keys	▼and ▲	COd	**72**
3	Press "P" key to set the temperature	P		
4	Set the temperature value by using the ▼ and ▲keys (the second display show set point temperature; eg: -80°C)	▼and ▲	SP	**-80**
5	Press "P" key until r.2	P		
6	Set the r.2 value by using the ▼ and ▲keys	▼and ▲	r.2	**1**
7	Press "P" key to set the Alarm Low	P		
8	Set the Alarm Low value by using the ▼ and ▲keys (the second display show temperature; eg: -90°C)	▼and ▲	AL.L	**-90**
9	Press "P" key to set the Alarm High	P		
10	Set the Alarm High value by using the ▼ and ▲keys (the second display show temperature; eg: -70°C)	▼and ▲	AL.H	**-70**
11	Press "P" key to set the hysteresis	P		
12	Set the hysteresis value by using the ▼ and ▲keys (the second display show set point hysteresis; eg: 1°C)	▼and ▲	HYS	**1**
13	Press "P" key to confirm	P		
14	Allow some time for the instrument to switch back to the process value display			

3.5.2 Power Failure Alarm

Power failure switch should always be turned on when the unit runs. Refer to section 2.3 for details.

Chapter 4 - General Maintenance

4.1 Scheduled Maintenance

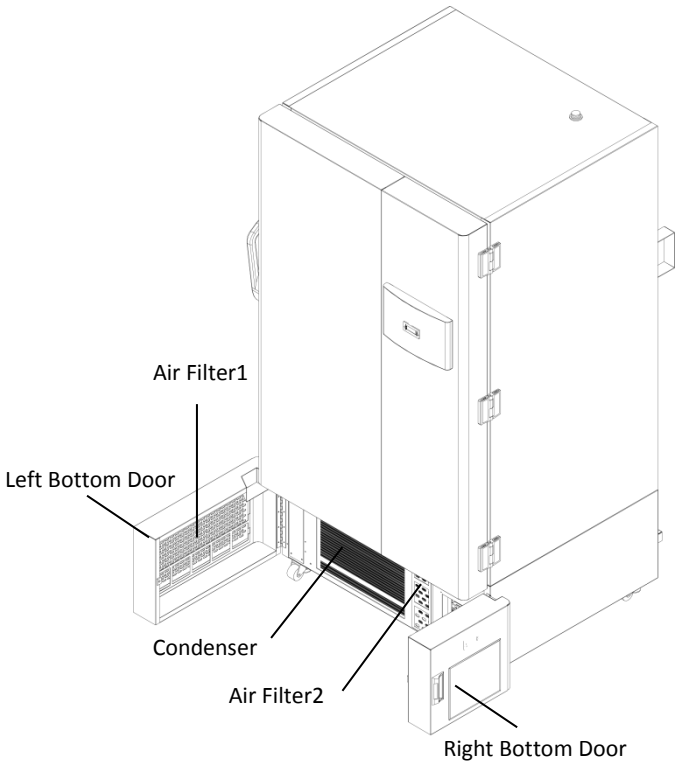
Proper and timely maintenance is crucial for trouble free functioning of any device and your Esco ULTF is no exception to this rule. We strongly recommend that you follow the maintenance schedule suggested hereunder in order to obtain optimal performance from your Esco ULTF.

No.	Description of Task to Perform	Maintenance to be carried out every			
		1 Month	3 Month	6 Month	As Needed
1	Door gasket cleaning	√			
2	PF battery checking	√			
3	Air filter cleaning		√		
4	Condenser cleaning			√	
5	Vacuum relief port cleaning				√
6	General cleaning				√
7	Defrost and cleaning				√
8	Replace battery(s)				√

Above is the minimum frequency. More frequent maintenance is required depending on actual condition of the freezer.

4.2 General Cleaning

Routine cleaning of freezer should be carried out. The surfaces can be cleaned by wiping down with clean water and a mild detergent using a sponge.



4.3 Condenser Cleaning

Cleaning the condenser is one of the most important tasks to ensure the unit operates properly and efficiently. A clogged condenser often results in poor performance and raised power consumption. In some cases, clogged condenser can choke the system's air intake and cause severe damage to the compressors.

To clean the condenser, pull open the left and right bottom doors. Use a household type of vacuum cleaner to vacuum the fins. Make sure you can clearly see through the fins after the vacuum operation is completed.

The condenser should be cleaned once every 6 months or more frequently if the area is dusty.

4.4 Air Filter Cleaning

The air filters are the first line of defense against dust and dirt that might be pulled into the condenser. It is necessary to inspect and clean the air filters on a regular basis.

To clean the air filter, open both left and right bottom doors, there are two air filters installed. Remove the condenser air filter, and wash it in water. Dry it out and place it back in the air filter holders.

The air filter condition should be inspected and washed once in every 3 months. Replace the filter if it is too dirty or worn out.

4.5 Door Gasket Cleaning

The door gasket is an important part to maintain and seal the freezer to achieve a proper temperature. Over time, the gasket can get deformed or damaged if not properly kept clean from ice. To clean off the ice and frost accumulating on the gasket, use a dull plastic scrapper to wipe off ice and frost accumulation that sticks to the ice surface. Wipe off the water from the gasket before closing the door. Door gasket should be cleaned at least monthly. More frequent cleaning may be required if dirt or excessive frost build-up prevents the door from closing properly.

4.6 Vacuum Relief Port Cleaning

Use a soft cloth; remove any frost build-up from the vacuum relief port, located at the back of the main door (See Quick View). Cleaning of vacuum relief port should be performed regularly, depending on how often and how long the door is opened.

4.7 Defrost and Cleaning

The amount of frost accumulation in the freezer depends on how often and how long the door is opened. As the frost gets thicker, the efficiency of the unit is adversely affected. The frost acts as an insulator as it slows down the system's ability to remove the heat from the freezer; this causes the unit to use more energy.

To remove the frost, move all products to another freezer that operates at the same temperature as the Esco unit temporarily.

Turn off the power on the Esco unit, open the outer and inner doors to let the unit warm up. Place some towels or other absorbent material around the freezer to absorb any melted frost that might run out. Once the freezer is thawed, wipe off the condensation with a towel. Use a mixture of warm water and light detergent to clean the interior and exterior of the unit carefully; do not let water drip into the refrigeration and electrical compartments. Once cleaned, dry and power up the unit (see ***section 2.3 First Run***).

4.8 PF Battery Checking

Locate the battery (see ***section 1.3 Quick View***) and check its voltage output using a digital volt-meter. Battery should be replaced when the voltage falls below 11 volts or after one year of operation, whichever comes first.

4.9 Preparing the Unit for Storage

Defrost and clean the unit as described in ***section 4.6 Vacuum Relief Port Cleaning***. Turn off the battery power switch. Turn off the freezer power switch. Disconnect power to battery(s) and to the freezer. The unit is ready for storage.

4.10 Maintenance/Service Log

It is good practice (and in some cases regulatory requirement) to maintain a log of all maintenance work carried out on your freezer.

Chapter 5 –Accessories Installation

5.1 LCO2/LN2 Backup System

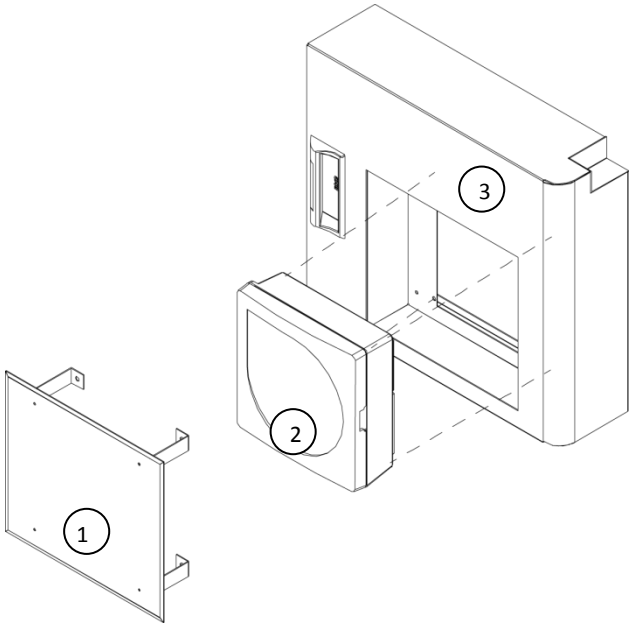
The backup system will keep the freezer chamber temperature below the critical level in the event of a power or equipment failure. If power to the freezer fails, or the freezer warms above the user-defined set point, the Backup System injects a controlled amount of liquid CO_2 or N_2 into the chamber to keep the chamber temperature within the specified temperature range.

The LCO_2 or LN_2 must be injected from the access port located at the top side (back right corner) of the freezer. The backup system probe should be installed side by side with control probe inside the cabinet.

For more information on the LCO2/LN2 backup system, please refer to the User Manual attached to the accessory.

(Important Note: When selecting a LCO_2 or LN_2 supply cylinder, it must be equipped with a siphon tube)

5.2 Chart Recorder



The chart recorder is used as an independent temperature monitoring for the freezer.

To install the chart recorder into the Freezer: Open the cover plate (1) on the right bottom door and install 4 screws at the corners of chart recorder (2) from the back of right bottom door (3).

For more information on how to run and calibrate the chart recorder, please refer to the chart recorder User Manual attached to the accessory.

Chapter 6 – Troubleshooting

Under no circumstances should the unit be disassembled, repaired, or converted by unqualified people. Failure to follow these instructions may cause personal injury and/or loss of property due to malfunctions, electric shocks or fire.

Should the unit malfunction, stop the operation, and then pull out the power plug or turn off the power supply at source. Continuing to operate the unit when it shows signs of malfunctioning may cause irreparable damage to the freezer and/or its components.

The following troubleshooting guidelines address some of the basic problems that can be solved by the user or operator. However if the problem persist, please contact your local distributor.

Problem	Possible Cause
The freezer does not work (unit won't cool down at all)	Ensure that the power cable firmly connects the unit to the main power supply
	Ensure the fuse of the power cable is not blown
	Ensure that the unit has been turned on
	Ensure that the freezer's main door is closed
The freezer shows poor performance (unit won't cool down fast enough)	Ensure the temperature is set correctly
	Ensure the freezer is located correctly according to the location (section 2.1.1) and environmental (section 2.1.2) requirement
	Ensure that the products placed inside the freezer are pre-frozen. Products with room temperature require the freezer to cool down and freeze the products first, affecting the overall performance.
	Ensure that the freezer is not overloaded
	Ensure that the doors are not frequently open
The freezer generates unusual noise	Ensure the freezer is located correctly according to the location (section 2.1.1) and environmental (section 2.1.2) requirement

APPENDIX

APPENDIX A: LOG RECORD

Cabinet : _____
Serial Number : _____
Person in Charge : _____

1. This log record should be used by the operator to record any new agent/virus/bacteria/germs that has been introduced to the cabinet during its operation, problems encountered, etc.
2. Any decontamination procedure performed by either the user or the technician should be recorded down as well.
3. Please also record any major maintenance procedure performed by the service technician, for example: parts replacement, recertification, etc.

Date	Event	User Signature	Supervisor Signature

In case of emergencies, please call:
Name : _____
Cell Phone Number : _____
E-mail : _____

APPENDIX B: MANUAL REVISIONS

REV #	PAGE #	OLD	NEW	ECN NO.